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Ecofarming: No-Till Sorghum Following Ecofallow Corn or Sorghum

This NebGuide describes using no-till sorghum in ecofallow rotations, including hybrid selection, planting and weed control methods, fertilizing, and possible insect and disease problems.

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The ecofarming system using a winter wheat-ecofallow corn or sorghum-fallow rotation has increased corn and sorghum yields because more water is conserved by controlling weeds with herbicides than with tillage. The land is fallowed the year following corn or sorghum and planted to winter wheat in the fall.

Often enough precipitation is received during winter and/or early spring that another crop of sorghum could be grown instead of fallowing and planting wheat. If about 2000 lb/A or more of wheat residue plus corn and/or sorghum stubble are present to protect the soil surface from wind and water erosion and to conserve moisture, another sorghum crop may be considered. Sorghum is planted with a no-till planter into either weed-free ecofallow corn or sorghum stubble containing wheat residue. *Table I* compares sorghum yields obtained from disking and herbicides versus no-tillage and herbicides. Yields were increased 35% by using no-till. During 1981 to 1984 yields were considerably higher, due to more timely weed control, change in fertilizer practices, hybrids, and timely rains (*Table II*).

Table I. Comparison of seedbed preparation methods on yield of continuous sorghum at North Platte, 1976-79.*

Treatment	Rate/A	Weed yield		Sorghum yield grain 14% M
		Broadleaf	Grass	
		_____(lb/A)		bu/A

Tandem disk twice				
2,4-D amine + cultivation	1 pt	80	940	29 b
Paraquat + atrazine + Igran at planting	1 pt + 0.8 qt + 2.0 lb	250	330	28 b
No-till				
Paraquat + atrazine + Igran 2 weeks prior to planting	1 pt + 0.8 qt + 2.0 lb	71	230	43 a
Paraquat + atrazine + Igran at planting	1 pt + 0.8 qt + 2.0 lb	18	750	41 a
*Numbers followed by the same letter are not significant at the 5% level.				

Table II. Weed control and yields of no-till continuous sorghum at North Platte, 1981-84.*

Herbicide	Rate/A	Weed yield**	Grain yield 14% M
		lb/A	bu/A
Roundup at planting	1 pt	1400 a	42 c
Herbicides applied 10 days prior to planting with paraquat at 1 pt/A			
Ramrod	4 qt	834 b	63 b
Harness + atrazine 4L	2 pt + 1 qt	42 c	83 a
Lasso + atrazine 4L	2.5 qt + 1 qt	75 c	83 a
Bladex 4L + atrazine 4L	1 qt + 1 qt	84 c	84 a
Dual + atrazine 4L	2 pt + 1 qt	57 c	87 a
Igran 80W + atrazine 4L	2.5 lb + 1 qt	55 c	85 a
Dual + Bladex 4L	2 pt + 1 qt	160 c	82 a
*Numbers followed by the same letter are not significant at the 5% level.			
**Weed yields on Roundup treatment were 62% grasses, 21% Russian thistle, and 17% redroot pigweed.			

Corn should not follow a corn or sorghum crop unless the moisture supply by planting time has recharged the soil profile to nearly 6 feet. Sorghum, being more drought tolerant than corn, is usually a better choice. If corn follows corn, the use of a rootworm insecticide may be necessary.

Some farmers have extended the 4-year rotation to five or even six years. Producing a crop every year reduces land costs and delays the cost of summer fallowing at least one year. Soil conservation is also improved because during the fallow year conventional tillage practices are used to keep the soil weed-free and to prepare a seedbed for winter wheat. Excess tillage reduces crop residues and exposes the soil

to wind and water erosion.

Other reasons for extending the rotation and growing continuous no-till row crops may be to break the cycle of wheat diseases and to aid in controlling weeds. For *Cephalosporium* stripe, the 3-year rotation may not provide enough time to break the disease cycle. Since this pathogen can survive within residue of diseased plants, the infected fields should not be planted back to wheat for at least three years. Winter annual weeds, such as downy brome and jointed goatgrass, may be a problem in a winter wheat-fallow rotation. These weeds can be controlled best by killing the seedlings in the spring and growing either corn and sorghum or two sorghum crops before returning to winter wheat.

Table III. The estimated cost of producing a continuous no-till sorghum crop in southwest Nebraska for 1986. Estimated yield 70/A.

Item	Cost/Acre*
Sprayer	\$ 3.00
Bladex + 2,4-D	9.50
Sprayer	3.00
Deal + Atrazine	12.60
80 lb Liquid N	19.20
Planter	9.00
Seed (Concep II and seed box treatment)	3.30
60 lb 10-34-0	7.35
Aerial spraying greenbugs	6.00
Combine, Grain Head	12.60
Haul	7.00
Auger	0.70
Total	\$ 93.25
Interest, Overhead, Management, and Labor	15.00
Land	28.00
Cost per acre	\$136.25
**Cost per unit of production	
40 bushels	\$3.41
50 bushels	\$2.73
60 bushels	\$2.27
70 bushels	\$1.95
80 bushels	\$1.70
* Custom rates used. ** The lower yields (40, 50, and 60) should be decreased approximately 15 to 20 cents/bushels since some costs, such as nitrogen fertilizer rate, harvesting, hauling, and auger, are dependent on yield; the 80 bushel yield should be increased.	

Economics

The economics of continuous no-till sorghum indicate that a sorghum yield of 50 bu/A is needed at current wheat, corn, and sorghum production costs to compete with the 3-year rotation (*Table III*). If anticipated sorghum yield is greater than 50 bu/A, additional profit will be made by growing sorghum. For yields under 50 bu/A, the economics favor summer fallow and planting winter wheat in the fall. The best indicator of potential yield is soil moisture supply at planting time.

Moisture is the Key Factor

Sorghum recropping is best suited for areas that receive an average annual rainfall of 18 inches or more, and that have soils that can store a minimum of 1 1/4 inches of water per foot of depth. The probabilities of growing a successful no-till sorghum crop are reduced if less than 3 feet of soil are saturated at planting time. With less than 3 feet of moist soil, fallow the land and plant to winter wheat. Soils that have less water holding capacity need at least 4 feet of saturation.

Do Not Graze or Harvest Prior Crop for Silage

It is important that the sorghum/corn residues from the prior crop be maintained to protect the soil surface and the fragile winter wheat residue. Limited grazing can occur for a very short period of time. Cattle can glean heads or ears, and eat leaves and shucks that would normally be blown out of the field. The soil surface should be dry when the cattle are grazing. Less snow will be trapped if the residue is grazed. Grazing cattle will plant seed from the previous crop and weeds with their hooves.

If the prior corn or sorghum crop is harvested for silage, the fragile wheat residue will blow out of the field. You will then be trying to no-till without crop residues, which reduces weed control and moisture conservation. Crop failure is likely to occur.

Weed Control

A number of preemergence herbicides can be used in continuous no-till sorghum. These include atrazine, Bladex, Dual, Bicep, Lasso, Igran, and Bronco. With Dual and Bicep, use Concep II treated seed; with Lasso and Bronco, use Screen protected seed.

An excellent weed control program is to spray the sorghum stubble about April 1-15 with Bladex + 2,4-D. Sorghum can be planted 30 to 45 days later, depending on the amount of Bladex used. If sufficient soil water is present, plant sorghum. The land should be fallowed and planted to winter wheat in the fall if moisture is insufficient. If sorghum is planted, apply additional herbicides for controlling weeds. Generally, atrazine should be included in the herbicide combination (*Table II*). Application time is extremely important. Atrazine, Bicep, Bladex, Bronco, Dual, Lasso, and Igran can be applied prior to planting. Bronco, Lasso, and Igran should be applied within 5 days prior to planting to ensure that there is enough herbicide available to control weeds after planting. If any emerged weeds are present at the time of application of these herbicides (except Bronco), it will be necessary to use paraquat or Roundup. Usually the field will be weed free if the early preplant treatment of Bladex is used. Roundup needs to be applied in a separate application.

Most of the complaints of poor weed control are due to spraying weeds that are too large and not killing them. Weeds must be killed before planting to ensure a successful program. For the latest recommendations, see the current revision of *EC-130, Guide for Herbicide Use in Nebraska*.

If summer annual weeds become a problem, shift out of the continuous rotation of sorghum and plant winter wheat so these weeds can be controlled. Shattercane can be a major problem in continuous sorghum. Hand roguing and a ropewick application of Roundup can be very effective in controlling light infestations of shattercane. Refer to EC-1 30 for directions on using Roundup in a ropewick applicator.

Selection of the Sorghum Hybrid

Hybrid selection is extremely important because using the wrong hybrid can offset all the other right decisions. The biggest risk is selecting hybrids that are too extreme in maturity.

Short-season hybrids do not have the yield potential, and yields with long-season hybrids may be limited because of soil moisture limitations and early frost. Either maturity extremes can increase risks that few farming operations can tolerate.

Selecting a long season hybrid is usually the most hazardous unless there is an alternative use for the crop, such as silage. When using the crop as silage, the residue that is needed both in the rotation and to reduce wind and water erosion is lost.

Because the length of the growing season varies, it is best to stay with mid-season hybrids. Sorghum should be planted at 40 to 50 thousand seed per acre. Use the lower rate in western Nebraska. If soil temperatures are cold, increase the seeding rate by 10 percent.

Planting the No-Till Sorghum Crop

Sorghum planting should begin when the soil temperature at 2 inches reaches 65°F. Soil temperature beneath residues will be a few degrees cooler than bare soil. Planting dates vary from May 15 to June 15 across the state. Generally, planting can be done earlier in fields containing sorghum or corn residue with winter wheat residue that have gone through two or more winters than in fields containing heavy wheat stubble from the previous year. It is better to increase seeding rate and plant earlier if the growing season is not long enough. Grain must mature before the cool weather and frost in the fall.

Planting should be done between old rows of corn or sorghum with a planter that disturbs very little crop residue. Buffalo slot planters, John Deere Max-Emerge, International Early Riser, Kinze, White, and similar planters have worked successfully.

Fertilizing the Sorghum Crop

Nitrogen and phosphorus are needed for the sorghum crop in most soils. The best way to determine fertilizer needs is a soil test.

A 2- to 3-foot or deeper profile sample tested for nitrates gives a good indication of available nitrogen. Adjust the nitrogen rates by the amount found in the soil and the yield goal.

The nitrogen can be applied either as liquid, anhydrous ammonia or dry. It is important to apply the nitrogen as early as possible in areas receiving less than 20 inches of annual rainfall to ensure enough rainfall to move the nitrogen into the soil profile. The nitrogen needs to be located where the sorghum will be obtaining moisture in late July and August. All nutrients must be in the soil solution to be available to the plant. Liquid nitrogen fertilizer can be used as a carrier for the herbicides and can aid in weed control. Coulters should be used if anhydrous ammonia is applied to reduce disturbance of the crop residue. Occasionally, rainfall is not ample enough to prevent the ground from cracking where the

anhydrous knife ran in the field. When cost of application is considered, and since high amounts of nitrogen are not needed for nonirrigationd sorghum, cost savings of anhydrous ammonia are nil.

Phosphorus is needed by the young sorghum plant. If the soil test indicates that phosphorus is needed, or a boost in early crop growth is desired, use a starter fertilizer. With a starter, be aware of total nitrogen and potash content since these elements can injure the seed or seedlings. Twenty pounds per acre of P_2O_5 as a starter can be effective in giving the young sorghum plant a boost in the spring. Applied at planting time, the fertilizer should preferably be placed an inch or two below the seed. In most situations, 5 gallons of 10-34-0 placed directly with the seed will not injure the seed or seedling. This is equivalent to 19.4 pounds of P_2O_5 .

Insects

Wireworms and greenbugs are the two main insect problems for sorghum. Wireworms can be reduced by seedbox treatments of insecticides at planting. If a large wireworm infestation is anticipated, increase the planting rate to compensate for some of the damage that will be done by this insect, or use a band application of a soil-applied insecticide.

Greenbugs, especially the new biotype E, are a major concern to sorghum producers. The sorghum crop should be watched from emergence, and greenbug control measures used as necessary. For control measures, see the latest revision of *EC-1509, Corn and Sorghum Insect Control Recommendation Guide*.

Diseases

The primary disease of sorghum is stalk rot. If possible, plant hybrids that are tolerant to stalk rot. The incidence of stalk rot under the ecofallow system has not been as great as under conventional tillage. Sorghum growing in stubble is less stressed since soil temperatures are cooler and more soil moisture is available, thus reducing stalk rot incidences. In a 3-year study, stalk rot was reduced 28% and grain yield increased when grain sorghum was grown under no-till ecofallow as compared to conventional tillage. Minimum tillage was also included in the study, and stalk rot incidence was increased 12% compared to ecofallow. Other diseases usually are minor and have not seriously damaged the sorghum crop in this rotation.

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